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Rec'd 19-7-54

ANNUAL REPORT  
OF THE  
SUDAN VETERINARY SERVICE  
FOR THE YEAR  
1951/52.



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ANNUAL REPORT  
OF THE  
SUDAN VETERINARY SERVICE  
FOR THE PERIOD  
1ST. JULY 1951 TO 30TH. JUNE 1952.

## GENERAL.

Losses from contagious diseases were exceptionally low, probably lower than in any year during the past half century. Almost  $1\frac{1}{4}$  million prophylactic biological products were administered in the control of cattle plague. Despite staff shortages and transport difficulties the large scale use of attenuated goat virus and lapinised virus vaccines was extended to all the main cattle producing areas of the country with very satisfactory results. Approximately  $\frac{3}{4}$  million cattle were vaccinated against contagious bovine pleuro-pneumonia.

Many animal husbandry development schemes have been unfortunately held up pending the receipt of Professor J. H. Bisschop's report, the production of which was delayed owing to unforeseen circumstances.

## SECTION I.

### STAFF.

Resulting from the recommendations made to the Mills Terms of Service Commission the post of Director was upscaled and a new post of Deputy Director was created. Mr. J. D. M. Jack was selected for the latter post and Mr. A. W. Chalmers was promoted to the post of Assistant Director (Administration).

Mr. F. W. Priestley left the Sudan on final leave in April after five years excellent research work. The results of his work on contagious bovine pleuro-pneumonia research will no doubt play an important part in tackling the problem of the more effective control of the disease in the field. The death in July of El Rashid Eff. Abdel Nabi, B.E.M., veterinary assistant, was another serious loss to the research section. He had served the department loyally and faithfully for more than 30 years.

The following vacant posts existed on 30th June :—veterinary inspectors—five, veterinary research officers—two, entomologists—two, field zoologist—one, tsetse field officer—one, and pasture research officer—one.

The following appointments were made during the period—Mr. T. M. Leach—veterinary research officer, Mr. T. G. E. Gibson—veterinary inspector, Mr. A. W. Peers—pasture research officer, Dr. Mohd. Said Bayoumi—animal research officer, Saleh Mohd. Saleh Gaheen—veterinary officer and Messrs. J. D. Irving, A. L. Wild, R. E. Woodhouse and W. I. A. Dees—tsetse field officers. Mr. J. D. Irving retired on medical grounds within a few weeks of his appointment.

El Nazeer Eff. Dafalla, veterinary officer, distinguished himself by obtaining the Diploma in Bacteriology of the University of Manchester.

Distribution of classified technical staff on 30th June, 1952, was as follows :—



DESIGNATION.	NAME.	STATION
Director .. .. .	W. H. Glanville, 4N, M.R.C.V.S. ..	Khartoum
Deputy Director .. ..	J. D. M. Jack, M.R.C.V.S. .. ..	Khartoum
Asst. Director (Adm.) .. ..	A. W. Chalmers, M.R.C.V.S. .. ..	Khartoum
Senior Veterinary Inspector ..	I. A. Gillespie, M.R.C.V.S. .. ..	El Obeid
„ „ „ ..	P. Durran, M.R.C.V.S. .. ..	El Fasher
„ „ „ ..	J. K. Thomson, M.R.C.V.S., D.V.S.M. ..	Wad Medani
„ „ „ ..	P. Z. Mackenzie, M.B.E., M.R.C.V.S. ..	Wau
„ „ „ ..	H. B. Luxmoore, B.Sc., M.R.C.V.S. ..	Singa
Veterinary Inspector .. ..	D. G. Clow, M.R.C.V.S. .. ..	Malakal
„ „ .. ..	Ibrahim Mohd. Khalil, Dip. Vet. Sci.	Study leave U.K.
„ „ .. ..	M. J. Henigan, M.R.C.V.S. .. ..	Torit
„ „ .. ..	D. J. Stewart, M.R.C.V.S. .. ..	Kassala
„ „ .. ..	A. Pollock, M.R.C.V.S. .. ..	Yirol
„ „ .. ..	A. W. Polden, M.R.C.V.S. .. ..	Fangak
„ „ .. ..	R. G. Pearson, M.R.C.V.S. .. ..	Nyala
„ „ .. ..	J. D. Paterson, M.R.C.V.S., D.V.S.M. ..	Kosti
„ „ .. ..	Zein El Abdin Mahmoud, Dip. Vet. Sci. .. ..	Khartoum
„ „ .. ..	Hussein Hassan Abbo, Dip. Vet. Sci...	El Obeid
„ „ .. ..	T. G. E. Gibson, M.R.C.V.S. .. ..	Wad Medani
Veterinary Officer .. ..	Ahmed Magdoub Abdoun, Dip. Vet. Sci. .. ..	Shendi
„ „ .. ..	Ahmed Mohd. Dahab, Dip. Vet. Sci.	Fangak
„ „ .. ..	Ganfar Karrar, B. V. Sc. (Cairo) ..	El Obeid
„ „ .. ..	Saleh El Din Imbabi, Dip. Vet. Sci. ..	Wad Medani
„ „ .. ..	Obeid Mohd. Ali Akoad, Dip. Vet. Sci.	Malakal
„ „ .. ..	Saleh Mohd. Saleh Gaheen, Dip. Vet. Sci. .. ..	Wad Medani
Inspector, Headquarters ..	J. McKay, M.B.E. .. ..	Khartoum
Asst. Superintendent .. ..	Ibrahim Hassan Osman .. ..	Khartoum
Inspector of Hides .. ..	E. Knew, Dip. Leathersellers Coll. ..	Omdurman
Hides Officer .. ..	Fuad Hassan Lutfi .. ..	Study leave U.K.

# RESEARCH

DESIGNATION	NAME	STATION
Asst. Director (Research) ..	J. T. R. Evans, B.Sc., M.R.C.V.S. ..	Khartoum
Veterinary Research Officer ..	El Amin Abdulla El Karib, Dip. Vet. Sci. .. ..	Khartoum
„ „ „ ..	Mohd. Ali Miheimid, Dip. Vet. Sci. ..	Malakal
„ „ „ ..	T. M. Leach, M.R.C.V.S., D.V.S.M. ..	Khartoum

DESIGNATION	NAME	STATION
Laboratory Technician .. ..	R. W. White, F.I.M.L.T. .. ..	Khartoum
„ „ .. ..	J. A. Aspey. A.I.M.L.T. .. ..	Khartoum
Veterinary Officer .. ..	El Nazeer Dafalla, Dip. Vet. Sci. Dip. Bact. (Manc.) .. ..	Study leave U.K.
„ „ .. ..	Saad Mahanna, Dip. Vet. Sci. .. ..	Khartoum
Pasture Research Officer ..	M. N. Harrison, B.Sc. (Agric.) ..	Khartoum
„ „ „ ..	J. H. Davies, B.Sc. (Agric.) .. ..	Malakal
„ „ „ ..	A. W. Peers, B.Sc. (Agric) .. ..	Malakal
Tsetse Reclamation Officer ..	J. W. Chorley, M.B.E., F.R.E.S. ..	Wau
Veterinary Entomologist ..	E. T. M. Reid, B.Sc. .. ..	Wau
Tsetse Field Officer .. ..	A. L. Wild .. ..	Wau
„ „ „ .. ..	R. E. Woodhouse .. ..	Wau
„ „ „ .. ..	W. I. A. Dees .. ..	Wau
Animal Research Officer ..	Mohd. Said Bayoumi, B.Sc., Ph. D. ..	Khartoum

The establishment of other classified staff was increased considerably and on 30.6.52. was as follows :— 1 staff clerk, 27 clerks, 1 accountant, 4 bookkeepers, 2 sarrafs, 3 storekeepers, 25 veterinary assistants, 43 head stockmen and 18 hide graders.

There was also a large increase of unclassified staff which included 172 stockmen, 214 attendants, 4 farriers, 1 carpenter, 14 storemen, 3 pump mechanics, 46 motor car drivers, 4 flaying demonstrators, 23 messengers and some 70 fly catchers etc., of the tsetse survey and reclamation teams. A considerable number of casual labour was also employed for varying periods depending on programmes of work.

## SECTION II.

### DISEASES OF ANIMALS.

#### Cattle Plague.

No serious outbreaks occurred in the Bahr El Ghazal where the large scale use of goat virus and lapinised virus vaccines was continued. 172,500 doses of goat virus vaccine and 78,600 doses of lapinised virus vaccine were administered. 20,600 doses of serum were used in the control of the sporadic outbreaks that occurred. All outbreaks in the western half of the province were attributed to the movement of sick cattle but in the Yirol sub-District of Lakes District a certain amount of infection was thought to have been spread by game animals. Sick and dying game were seen on several occasions. A large area in the centre of the province remained free of the disease throughout the year.

There was a vast improvement in the cattle plague position in the Blue Nile Province. The Fung District remained free of the disease for the entire period. Kosti District was free for six months



and the Irrigated Area was free for four months. 36,000 cattle (including 18,800 in the Fung District) were immunised with goat virus vaccine. 6,800 cattle were serumised in the comparatively few outbreaks that occurred in the White Nile and Irrigated Areas. 12,700 export cattle and 22,100 slaughter cattle were protected with tissue vaccine.

Though outbreaks of the disease were reported from Darfur Province throughout the period, losses were low and mostly confined to young cattle. The large scale immunisation campaign was continued and 263,140 cattle were inoculated with goat virus or lapinised virus vaccine. Between July and February 13,000 doses of tissue vaccine were used for the protection of trade cattle. From March to June goat virus vaccine was used for this purpose.

In Equatoria Province the incidence of the disease in Eastern District was less than in previous years. Elsewhere in the province there were only a few sporadic outbreaks mostly among calves. The immunisation campaign was continued in Torit, Juba and Moru Districts and 53,000 cattle were inoculated with goat virus or lapinised virus vaccine. There was some improvement in the response of the Latuka tribe and it is estimated that about 60 percent of their susceptible cattle were vaccinated.

A doubtful case of cattle plague was reported during March in a calf which died at the Port Sudan dairy. All other members of the herd were serumised and no further losses occurred. Elsewhere Kassala Province was free of the disease throughout the period. 30,500 doses of tissue vaccine were used for the protection of tribal animals.

Three small outbreaks occurred in Khartoum Province and were quickly suppressed by the serumisation of 317 in-contact cattle. 3,000 cattle not associated with outbreaks of the disease were protected with tissue vaccine.

The incidence of the disease was comparatively low in Kordofan Province, although outbreaks occurred throughout the period, being most numerous in Jebels, Northern and Tegali Districts. 26,400 cattle were serumised in the control of outbreaks. 55,500 doses of tissue vaccine were used for the protection of tribal herds and trade cattle. 190,500 inoculations were carried out during the goat virus vaccination campaign which was extended to various parts of the province.

Northern Province remained free of the disease for the whole year. All cattle prior to admission to markets were vaccinated with tissue vaccine.

During the rainy season of 1951 the disease was fairly widespread in the Upper Nile Province and no district remained free but by November there was a marked decline in the number of outbreaks. During that month large scale immunisation with tissue vaccine of the Gaatjok section in Eastern Nuer District was undertaken. These cattle were vaccinated prior to their crossing the Baro river into Ethiopia on their annual migration and it was encouraging that the first veterinary attention offered to these people on a

notable scale met with marked co-operation. For the remainder of the period under review no serious epidemics occurred. In March large scale immunisation with goat virus and lapinised virus vaccines was introduced into the province for the first time. Working from a steamer, the campaign met with marked success among Bor Gok, Bor Athoic Dinka and some of the Northern Dinka, while the Shilluk was dealt with by a team travelling by motor transport. The following cattle plague prophylactics were used during the period in the province :—32,600 doses of serum, 105,600 doses of tissue vaccine, 26,600 doses of goat virus vaccine and 14,900 doses of lapinised virus vaccine.

### **Contagious Bovine Pleuro-Pneumonia.**

In the last two years more than half a million cattle have been vaccinated against this disease in the Bahr El Ghazal Province and the incidence of the disease has been reduced to negligible proportions. In the major portion of the province early information of outbreaks is now the rule and councils have played their part on occasions by insisting on the slaughter of infected animals. All cattle attending cattle plague vaccination centres were simultaneously vaccinated with pleuro-pneumonia vaccine. During the period under review 281,626 were vaccinated.

In the Blue Nile Province, the Fung District remained free of the disease for the second successive year. Elsewhere in the province there was no improvement in the disease incidence and the control of the disease is now the most difficult veterinary problem. 38,400 were vaccinated.

The disease was widespread in Darfur Province and at present is probably responsible for more losses than cattle plague. Confidence in the vaccine has been fully restored and 158,682 doses were used during the year. The supply and distribution of the vaccine presents some problems in the field during the rains and it is difficult to avoid wastage owing to its short keeping period and the necessity of ordering in advance of estimated requirements.

Outbreaks occurred in Juba, Torit and Eastern Districts of Equatoria Province but losses from the disease were lower than in previous years. 59,500 cattle were vaccinated.

Three small outbreaks occurred in Gedaref District, Kassala Province during November and December. They were quickly suppressed by slaughter of infected animals. Slaughter cattle from the Blue Nile Province were thought to have been responsible for the outbreaks. In April the disease was reported in a herd of twenty cattle grazing near the Eritrean border in Tokar District. One beast died and the rest were vaccinated. No further losses were reported.

Four outbreaks occurred in Khartoum Province involving about 1,000 cattle. Eighteen died or were slaughtered and the remainder vaccinated. 124 cases were detected on post-mortem inspection at the slaughter houses in the three towns of Khartoum, Khartoum North and Omdurman.



There is no doubt that the disease has increased considerably in Kordofan Province and is now widespread in nearly all districts. Trade cattle continued to be the main factor in spreading the disease. Over 600 deaths were reported as having occurred in outbreaks among tribal herds and 1,170 merchants' cattle which were infected were slaughtered at El Obeid. Vaccination was carried out on a large scale. Over 84,000 cattle were vaccinated in connection with outbreaks while 101,500 cattle not associated with outbreaks were also vaccinated. More effectively to control the disease the Dar Messeria District Council decided to pay compensation to owners who slaughtered infected cattle.

No cases of the disease were reported from Northern Province.

The disease was present in all districts of the Upper Nile Province. The nilotic cattle owners in general are slow and apathetic about reporting the disease and this is no doubt due to the absence of any quick and efficient method of dealing with outbreaks such as can be offered for cattle plague. The poor communications of the province and the short period of efficacy of the vaccine are factors which make more effective control of the disease difficult.

#### **Bovine Trypanosomiasis.**

The epidemic in the Twij country of the Bahr El Ghazal Province which occurred during the previous year died down after the light rains of 1951. This disease, however, does remain a problem in the province. 8,754 infected cattle were treated with dimidium bromide during the year. During the 1951 rains there was a northward extension of the main tsetse fly belt into the town of Rumbek and its environs. This had a most serious effect on the town's three dairies and drug treatment of infected cattle was unable to stop numerous deaths occurring in the cattle which were becoming reinfected every time they went out grazing. Eventually in April the town's dairies were put under permanent antrycide protection and an area of grazing was scheduled for their specific use. Antrycide pro-salt was also used with very satisfactory results for the protection of Forestry Department bulls working in fly country, for 1658 slaughter cattle which were moved on the hoof through the tsetse belt to Equatoria Province and for some 200 cattle in four herds living in fly country in Western District.

A small outbreak was reported in Kosti District of the Blue Nile Province. Infected cattle were successfully treated with dimidium bromide.

In the Southern District of Darfur Province, 1253 infected cattle were treated with antrycide.

There were no outbreaks of serious consequence in Equatoria Province where 2522 infected cattle were treated with dimidium bromide.

A few cases of the disease were diagnosed clinically among cattle in the Gedaref District of Kassala Province.

The incidence of the disease was very low in Kordofan Province. Some 3,500 infected cattle were treated with dimidium bromide.

During the latter part of 1951 the disease was everywhere present in some degree in the Upper Nile Province but in no case did the situation cause serious concern—a very different picture from the previous dry season. This may be ascribed mainly to widespread treatment of clinical cases with dimidium bromide and also to the exceptionally low floods. Notification in October of a highly fatal disease among Nuer cattle near Akobo in Pibor District proved to be the acute form of the disease. Apparently healthy cattle were dying within two or three days of appearance of the first signs of ill-health. The area concerned was heavily inundated by exceptionally late heavy rain. Treatment with dimidium bromide quickly suppressed the outbreak. Treatment of infected animals with dimidium bromide in other districts was continued with satisfactory results. Over 100,000 cattle were treated in the province.

#### **Trypanosomiasis in Other Animals.**

The disease was not so prevalent in camels as last year. Approximately 60,000 doses of antrypol were issued for the treatment of infected animals. Antrycide was used with very satisfactory results for the treatment of infected camels which had failed to respond to treatment with antrypol. Over 1,000 doses of antrycide were used in Kassala and Blue Nile Provinces.

Antrycide was used for the protection of 150 horses and donkeys in Bahr El Ghazal Province and in the Southern District of Darfur Province 50 horses and 23 donkeys received treatment with antrycide. It was reported that Arab horsemen from southern Darfur had entered the fly belt in Bahr El Ghazal Province and hunted giant eland. It was suspected that the horses used on this hunting trip were some of those that had received antrycide treatment. To prevent further excursions treatment with antrycide for horses in southern Darfur was forbidden.

#### **Foot and Mouth Disease.**

There was an increased incidence of the disease and two outbreaks occurred at Khartoum North export quarantine park, the first in September and the second in May.

A few sporadic outbreaks of no consequence occurred in the western half of the Bahr El Ghazal Province. Nineteen outbreaks were reported in the Blue Nile Province, twelve of them in the Irrigated Area. In the Fung District which had four outbreaks numerous abortions occurred during the febrile stage. An outbreak occurred in the Juba district of Equatoria Province which involved the Government dairy herd and caused several deaths. It was reported that the number of “panthers” in Eastern District appeared to have increased. In Kassala Province an outbreak of very mild character was reported south of the Rahad river in May. In Khartoum Province an outbreak occurred at the Belgravia Dairy. The disease was prevalent in Kordofan Province and the spread of the disease by the illicit movement of cattle from the province into the Shilluk District of the Upper Nile Province interfered with the goat virus vaccination campaign in the area. No reports of the disease were received from Darfur or Northern Provinces.



### **Anthrax.**

This comparatively rare disease was responsible for considerable losses in the Southern District of Darfur Province. There was a severe outbreak in Dar Habbania and Dar Beni Helba in August when 310 cattle, 9 horses and 9 donkeys died. Another outbreak occurred in June at Muhaganiya. 77 cattle and 33 donkeys were reported to have died. In addition to quarantine and other control measures over 95,000 vaccinations were carried out in the affected areas.

A few sporadic outbreaks were reported from Blue Nile, Kassala, Khartoum and Kordofan Provinces.

No cases of the disease occurred at the export quarantine parks among export cattle, all of which had been previously vaccinated.

### **Cryptococcus Infections.**

Losses among horses and mules were lower than in previous years. There was a big improvement in the Fung District where losses had been very high in 1950/51. Strict deticking was enforced and the decrease in the number of tick sores was the most potent factor in reducing the incidence of the disease.

### **Rabies.**

Reported losses from the disease were 46 compared with 119 during the eighteen month period in 1950/51. The following table shows the number and distribution of positive cases :

Animal				Positive	Negative
Dog	..	..	38		147
Donkey	..	..	3		10
Horse	..	..	—		9
Cat ..	..	..	1		8
Calf ..	..	..	3		1
Cow ..	..	..	1		1
Gazelle	..	..	—		1
Sheep	..	..	—		3
Goat	..	..	—		1
Monkey	..	..	—		1
TOTAL	..	..	46		182



The appearance of the disease for the first time for many years on the west bank of the Jur river in the Bahr El Ghazal Province called for the destruction of all dogs in Wau. In Darfur Province, in addition to numerous stray dogs, 29 leopards, 51 lions, 1172 jackals and 1453 hyaenas were destroyed. 434 dogs, 15 hyaenas, 19 wolves, 35 jackals and 268 foxes were destroyed in Northern Province. In Khartoum Province 189 dogs and 576 cats were destroyed.

#### **Other Diseases.**

The following table shows the distribution of some other diseases which received attention during the year :—



## **TRADE IN LIVESTOCK AND LIVESTOCK PRODUCTS.**

### **EXTERNAL TRADE.**

#### **General.**

There was a decrease in the export trade of all livestock and livestock products. Railway strikes, covering 11 days, interfered with the export trade in August and January. Foot and Mouth disease held up the cattle and sheep trade in September and May for a total period of five weeks. The internal situation in Egypt from October onwards interfered with the unloading of animals at Suez with the result that it was impossible to export to Egypt via Port Sudan for a period of about 6 months.

The total value of livestock and livestock products exported amounted to over £E. 2,800,000.

#### **Cattle and Sheep.**

26,075 cattle valued at £E. 523,036 were exported. All exports went to Egypt. With the exception of about 4,000 head which were exported via Port Sudan, all cattle exports were by the Nile valley route.

There was a marked decrease in the number of sheep exported. Apart from the transport difficulties mentioned above, increased prices in the Sudan and decreased prices in Egypt were other factors responsible for the reduction in exports. 28,906 sheep valued at £E. 143,490 were exported. With the exception of 3,547 head which were exported to Saudi Arabia all exports were to Egypt, 3632 head being exported via Port Sudan and the remainder via Wadi Halfa.

#### **Camels.**

35,077 camels valued at £E. 1,188,335 were estimated to have been exported to Egypt by overland routes.

#### **Hides, Skins and Leather.**

Hide and skin prices continued to decline steeply during the whole of the period under review and exports decreased. The royalties on these products were greatly reduced in April.

Hide exports totalled 3067 tons valued at £E. 570,338. The United Kingdom with 1089 tons and Egypt with 1233 tons were the principal importers. The export grading scheme was simplified on January first by reducing the number of grades of each type of hide from four to two and it was finally abolished in June. Though the export grading scheme during the past few years did not produce as much improvement of hides as was anticipated, there is no doubt that the detailed information collected at the grading depots will be of inestimable value as a foundation for future improvement plans. During the period under review 379,731 hides were received at the depots compared with 865,775 during the eighteen month period in 1950/51. Of the hides graded 114,822 were drysalted hides from the slaughter houses of the northern Sudan and 264,909 were air dried hides mainly from Darfur, Upper Nile and Bahr El Ghazal.



Provinces. 9 per cent of the air dried were frame dried compared with 7.2 per cent in 1950/51. The following table shows the origin of all air dried hides and the percentage of frame dried, received at the depots :—

PROVINCE.	Total Air dried	Ground Dried	Frame Dried	%Frame Dried.
Bahr El Ghazal ..	64,031	57,540	6,491	10.1
Blue Nile ..	4,780	4,780	0	0
Darfur .. ..	98,173	97,291	882	0.9
Equatoria ..	775	0	775	100
Kassala .. ..	5,420	5,325	95	1.7
Khartoum ..	788	579	209	26.5
Kordofan .. ..	17,294	17,294	0	0
Northern .. ..	4,172	4,172	0	0
Upper Nile ..	69,476	52,711	16,765	24.1

Sheep skin exports totalled 915 tons valued at £E. 186,587. The United States of America was the biggest importer and took more than 70 percent of the skins (616 tons). Goat skin exports totalled 156 tons valued at £E. 49,096. The United States of America with 64 tons and France with 56 tons were the principal buyers.

Exports of other skins chiefly snake, crocodile and lizard totalled 188 tons valued at £E. 80,618, a large increase on previous years. Egypt and France were the largest importers.

Leather exports totalled 22 tons valued at LE. 11,974.

## INTERNAL TRADE.

### LIVESTOCK MARKETS AND SLAUGHTERING FIGURES

During the year 1951 over half a million cattle, camels, sheep and goats were sold in the thirteen most important animal markets of the country for a total of over £E. 2½ million. Prices of all animals continued to increase.

Average prices at Nyala and El Obeid during the period under review were as follows:—

			Camels.	Cattle.	Sheep.	Goats.
			£E. m/ms	£E. m/ms	£E. m/ms	£E. m/ms
Nyala	..	..	15.238	7.124	1.211	0.822
El Obeid	..	..	18.954	8.721	3.019	1.683

There were times in the animal market towns of Khartoum, Blue Nile and Northern Provinces when average prices increased to as much as £E. 25.700m/ms. for camels, £E. 18 for cattle, £E.4.698 m/ms for sheep and £E. 2.917 m/ms. for goats.

212,425 sheep, 58,697 cattle, 28,227 goats and 2,136 camels were slaughtered in the ten principal towns of the country. Meat prices remained high and the retail price of beef in Khartoum increased in April 52 to 168 millemes per oke.

### Hides and Skins.

Members of the hides section continued to demonstrate improved methods of hide preparation, while on tour in the provinces and at agricultural shows and tribal gatherings. The training of nilotic tribesmen of the Upper Nile Province was continued at Malakal and a similar course of training was carried out at Juba in Equatoria Province.

Measures to improve slaughter house hides were intensified. Twelve slaughter houses have been reconstructed and are now provided with hoists, gambrels, tail-grips, hide washing pits etc. A further six slaughter houses are under re-construction and will be ready for production in the very near future. Legislation to control flayers was introduced in March. The following conditions apply to licensed flayers:—

- (a) The holder shall not use any knife for ripping and flaying unless it is of a pattern approved by the Sudan Veterinary Service.
- (b) The holder shall rip all hides and skins in a manner approved by the Sudan Veterinary Service.
- (c) Damage caused by the holder to any hide or skin by improper or careless use of a knife or other instrument shall be a punishable offence.



- (d) The holder shall employ in a proper manner the facilities provided by the licensing authority for the improvement of hides and skins.

The intention is to apply this legislation only to slaughter houses which are provided with proper facilities. It was applied to Khartoum slaughter house from March onwards. Prior to March hides from this slaughter house, according to grading standards for flaying defects were never better than thirds but in March 59 per cent were firsts, with no cuts or scores caused by the knife, 34 percent were seconds with slight scores or minor cuts, 6 percent thirds and 1 percent rejects. At the same time in co-operation with the hide purchasers a bonus scheme was introduced whereby flayers who produced more than 50 percent firsts received 5 milliemes for every first hide produced. A bonus of 10 milliemes was given to flayers who produced over 60 percent, 20 milliemes for over 70 percent and 30 milliemes for over 80 percent firsts produced.

The draft Hides and Skins Bill was submitted in May to the Executive Council who decided that there was not sufficient time for it to be presented to the Legislative Assembly before its prorogation.

#### **SECTION IV.**

##### **ANIMAL HUSBANDRY AND LIVESTOCK IMPROVEMENT**

Though the 1951 rains were light in the grazing areas of the northern Sudan, livestock, with the exception of some herds and flocks in Kassala and Northern Provinces, remained in remarkably good condition.

In general the condition of Government animals was excellent. Wastage from all causes was estimated at 7 percent.

In Kordofan Province a large number of scrub bulls were castrated. Over 60 bulls from Dar Beni Helba in Darfur were purchased for stud purposes in Dar Messeria in Kordofan Province. Kenana bulls were also imported from the Blue Nile Province. The Awlad Himeid of Tegali District purchased a number of stud bulls from the White Nile area of Blue Nile Province.

In Blue Nile Province over 1100 scrub bulls were castrated in the White Nile area. Copper bull nose rings were introduced in the White Nile area for the control of working oxen. They are much more humane than the native method of ear control. It was reported that over 500 Kenana heifer calves had been purchased in the Fung District by a merchant of Upper Nile Province, presumably for use as barter for bulls.

Since August, when it was decided to give permanent protection against trypanosomiasis by inoculations of antrycide pro-salt every two months to all cattle in the Torit dairy herd in Equatoria Province, milk production has steadily increased. For the first time production of milk exceeded demands and it was possible to produce two or three pounds of butter daily.



A few years experience at the Malakal dairy in the Upper Nile Province has shown that although milk production of nilotic cows can be increased by improved production methods it can never be a good commercial proposition in a town such as Malakal. Eight Kenana cows from the Fung District of the Upper Nile Province were purchased in the winter of 1951/1952 and have been found to do well in Malakal under the somewhat artificial conditions of the Government dairy. It is therefore proposed to assist the milk output by maintaining a number of Kenana cows in the dairy as well as cross breeding them with local stock. The average lactation period during the year was 31 weeks and the average yield 1101 pints. The highest individual daily yield was 20 pints from a cow bred in the dairy from a Shilluk dam and a northern sire.

In Darfur Province only 40 horses were offered for sale at Sibdu horse show. Five were purchased. Of the 82 at Id El Ghanam, 12 at Buram and 102 horses at Domaya offered for sale only 25 were purchased. Over 2,000 horses were ridden past in a parade for H. E. The Governor-General at Zalingei. They were mostly in poor condition and only 3 were purchased.

The country bred stallion Faragalla was the only sire standing at Khartoum during the period. He covered 38 mares. Registan the arab stallion was destroyed at Khartoum on account of old age.

The arab stallion Gawhar standing at Shendi and Merowe in Northern Province covered 32 mares.

A pilot poultry improvement scheme was started in Khartoum Province. Eggs of white, black and brown leghorns, anconas and bresses were received by air from the United Kingdom, and hatched out in Khartoum. It is proposed to ascertain the suitability of these various breeds for the northern Sudan and to compare them with indigenous breeds. In addition cross breeding will be carried out.

## SECTION V.

### EDUCATION.

Four veterinary assistants received special training in meat inspection and are ready to start work at the Kosti meat factory which it is expected will go into production shortly.

The training of tsetse fly catchers and surveyors was completed at the tsetse training school at Khor Kudu in Equatoria Province and they were posted to the tsetse survey and reclamation team working in the Bahr El Ghazal Province.

Good progress was made in the construction of the veterinary training school at Malakal in the Upper Nile Province, where subordinate veterinary staff will undergo courses of instruction.

## SECTION VI.

### MISCELLANEOUS.

#### Veterinary Hospitals and Dispensaries.

A number of new dispensaries were built in the Blue Nile Province. Apart from their educative value in making people veterinary minded they greatly facilitate the local control of disease. 283 animals were treated as out-patients at Wad Medani hospital.

306 in patient and 2348 out patient animals were treated at Khartoum hospital and the dispensary at Omdurman treated 275 in patient animals. The forge at Khartoum had a busy year. 3733 pairs of hand made shoes and 169 pairs of machine made shoes were fitted and 390 animals received other attention to their feet.

Over 6,000 animals were treated at the various hospitals and dispensaries in Northern Province.

#### Revenue and Expenditure.

The following table shows the actual revenue and expenditure of the department for the year :—

	1949	1950/51 (18 months)	1951/52. (12 months)
1. Revenue. . . . .	73,138	128,575	88,747
2. Expenditure.			
(ii) Personnel and Personal Allowances. . . . .	78,171	169,198	171,461
(iii) Capital. . . . .	3,233	9,320	5,651
TOTAL . . . . .	143,250	317,914	304,045
3. Development Budget. . . . .	75	1,696	51,248

(Signed) W. H. GLANVILLE,  
*Director,*  
*Veterinary Service.*



**REPORT OF THE ASSISTANT DIRECTOR (RESEARCH)  
FOR THE PERIOD  
1ST JULY 1951 TO 30TH JUNE 1952.**

**I. STAFF.**

The following table shows the establishment of classified staff on 30th June 1952, the existing vacancies and the appointments made during the year.

ESTABLISHMENT	DESIGNATION	VACANCIES	APPOINTMENTS
1	Assistant Director (Research) ..	—	—
6	Veterinary Research Officers ..	2	1
2	Veterinary Officers ..	—	—
1	Tsetse Reclamation Officer ..	—	—
3	Entomologists ..	2	—
4	Tsetse Field Officers ..	1	4
1	Field Zoologist ..	1	—
1	Animal Research Officer ..	—	1
4	Pasture Research Officers ..	1	1
2	Laboratory Technicians ..	—	—
5	Veterinary Assistants ..	—	—

The following officers were appointed :—

- (a) Veterinary Research Officer— Mr. T. M. Leach, M.R.C.V.S., D.V.S.M., (24.6.52).
- (b) Tsetse Field Officers— Messrs J. D. Irving (10.12.51), A. L. Wild (10.12.51), R. E. Woodhouse (24.1.52) and W. A. Dees (4.3.52),
- (c) Animal Research Officer— Mohd. Said Bayoumi, PH.D. B.Sc. (Agric.), (16.2.52).
- (d) Pasture Research Officer— A. W. Peers, B.Sc. (Agric.), (9.5.52).

Mr. W. F. Priestley, M.R.C.V.S., Dip. Bact., proceeded in April on final leave pending retirement. During his five years' service as Veterinary Research Officer Mr. Priestley was primarily responsible for carrying out fundamental work on the properties of the contagious bovine pleuro-pneumonia organism. Under his direction also the output of pleuro-pneumonia vaccine was increased so much that when he left the country the monthly output of nearly 100,000 doses was twice the annual output when he arrived. This advance, together with his professional publications, serve as a record of the very fine work he performed. Mr. Priestley's departure was very much regretted by all members of the staff and in particular by his Sudanese professional colleagues to whom he had endeared himself by his readiness always to help and guide them in their work.

Mr. J. D. Irving, Tsetse Field Officer, was invalided out of the country within a few weeks of his arrival, on account of the effects of a wartime injury.

Veterinary Officer Nazeer Eff. Dafalla, Dip. Vet. Sci., gained the Diploma in Bacteriology of the University of Manchester. This highly specialised diploma was a fitting culmination to excellent work done by him during his post graduate studies in the United Kingdom.

Mr. J. H. Davies, Pasture Research Officer, was seconded to the Jonglei Investigation Team for the whole of the year.



## II. BUILDINGS.

A three-room wing was added to the main laboratory block to provide accommodation for additional staff approved. A new store room was also built.

## III. ROUTINE WORK.

Most of the time of the veterinary professional staff was, as usual, taken up with the preparation and distribution of biological products and the examination of specimens submitted for diagnosis. Some vaccines were purchased from Kenya and from South Africa and the ready co-operation of the respective Directors of Veterinary Services in supplying these products on demand is gratefully acknowledged.

Tables I and II show the sources and the doses distributed of the various biological products.

TABLE I.

Product	Source	Doses distributed
Cattle Plague Tissue Vaccine .. ..	Malakal Lab. ..	218,920
Attenuated goat virus vaccine .. ..	Kenya .. ..	1,085,750
Attenuated lapinised virus vaccine .. ..	Kenya .. ..	285,605
Cattle plague antiserum .. ..	Malakal Lab. ..	156,600
C.B.P.P. vaccine .. ..	Khartoum Lab. ..	987,500
Anthrax vaccine .. ..	South Africa ..	169,500
Blackquarter vaccine .. ..	Khartoum Lab. ..	6,360
Haemorrhagic septicaemia vaccine .. ..	Khartoum Lab. ..	3,600
Horse sickness vaccine .. ..	South Africa ..	1,442
Fowl typhoid vaccine .. ..	Khartoum Lab. ..	2,050
Newcastle Disease vaccine .. ..	South Africa ..	4,700

TABLE II.  
DOSES OF BIOLOGICAL PRODUCTS DISTRIBUTED TO PROVINCES

PROVINCE	Blue Nile	Kordofan	Kassala	Darfur	Khartoum	Northern	Upper Nile	Equatoria	Bahr-El Ghazal
Cattle Plague Tissue Vaccine .. ..	20,840	40,520	31,360	6,000	3,120	2,800	105,000	1,000	7,640
Gcat Virus Vaccine .. ..	75,750	303,000	250	390,750	—	—	41,000	78,000	197,000
Lapinised Virus Vaccine .. ..	—	500	—	110,375	100	—	22,500	27,750	124,380
Cattle Plague Antiserum .. ..	10,000	30,000	10,000	30,000	—	—	25,000	15,000	15,000
C.B.P.P. Vaccine .. ..	57,550	217,400	800	195,500	1,450	—	23,000	127,250	364,550
Anthrax Vaccine .. ..	13,550	29,000	3,700	117,460	5,800	—	—	—	—
Blackquarter Vaccine .. ..	960	4,560	—	—	—	—	—	840	—
Haemorrhagic Septicaemia Vaccine ..	860	600	—	—	280	—	1,620	—	240
Horse Sickness Vaccine .. ..	595	300	61	180	159	72	38	4	23
Fowl Typhoid Vaccine .. ..	—	—	—	—	—	—	—	1,550	500
Newcastle Disease Vaccine .. ..	2,600	200	—	—	1,600	—	—	100	200

The following are some notes on those products that require comment.

**Cattle plague tissue vaccine** (Glycerinised lymphoidal tissue).

Greater difficulty than usual was experienced in obtaining susceptible cattle for the preparation of this vaccine and only about two thirds of the normal output was prepared. Fortunately, this deficiency did not matter, since the extensive use of attenuated goat and lapinised virus vaccines reduced considerably the demand for the product.

**Attenuated goat virus vaccine.**

The demand for this vaccine increased very much during the year and over a million doses were distributed. Only adult cattle were inoculated with it and the results were universally satisfactory.

**Attenuated lapinised virus vaccine.**

Previous experience had shown that when calves were inoculated with attenuated goat virus vaccine severe reactions frequently occurred and there was a mortality rate of about ten per cent. This practice was consequently stopped and, instead, attenuated lapinised virus vaccine was used to produce temporary protection prior to giving them permanent immunity a year later by inoculation with attenuated goat virus vaccine. Even following inoculation with attenuated lapinised virus vaccine high temperature reactions, with lachrymation and diarrhoea, occurred in many calves. Virtually none of the reactors died.

**Cattle plague antiserum.**

The customary quantity of antiserum was prepared and distributed but on account of the widespread use of attenuated virus vaccines the bulk of it remained unused. Improved communications have largely eliminated the need for depots of antiserum at distant places and there appears now to be no justification for continuing to prepare this product which for so many years played a vital part in the control of cattle plague in the Sudan.

**Contagious bovine pleuro-pneumonia vaccine.**

Nearly a million doses were issued and no serious "accident" following its use was reported. Contrary to previous practice none of this vaccine was at any time kept in cold storage, because of the theory reported in the 1950-51 Annual Report that such storage might in some instances cause a recrudescence of virulence as was known to occur when "safe" cultures were freeze-dried. Experiments carried out by Mr. Priestley to test this theory, however, gave inconclusive results. Nevertheless the practice of not storing the vaccine in refrigerators was continued because considerable circumstantial evidence favoured the suspicion that transport of previously refrigerated vaccine at Sudan shade temperatures might in some instances be dangerous.



### Diagnosis of specimens.

A total of 1,091 specimens were submitted by the Field Staff for examination. The diagnoses were representative of those made most years except that Koch's Blue Bodies and *Theileria* were found in blood smears taken from cattle near the Uganda border. This first proof of the existence of East Coast Fever along the southern border is not surprising since the common vector, *Rhipicephalus appendiculatus*, has been found there, and the disease is enzootic in Uganda.

## IV. RESEARCH.

### 1. Bovine Trypanosomiasis.

Some preliminary therapeutic and prophylactic trials of new phenanthridine derivatives were carried out using a field strain each of *Trypanosoma congolense* and *T. vivax*. Simultaneously the *T. congolense* strain was deliberately made resistant in cattle to the action of antrycide methylsulphate (5.0 mg. per kilo) in one case and dimidium bromide (1.5 mg. per kilo) in another, and the activity of some of the new derivatives on these drug resistant strains was tested.

The following phenanthridine compounds were used :—

150 C 47 (Wellcome) 2:7-diamino-9-aminophenyl-10-methylphenanthridinium chloride.

621 C 47 (Wellcome) 2:7-diamino-9-d-thienyl-10-methylphenanthridinium bromide.

115 C 51 (Wellcome) Bis-4:4-(2:7-diamino-9-phenanthridyl) azobenzene bismethochloride.

293 C 51 (Wellcome) 3:7-diamino-9-p-aminophenyl-10-methylphenanthridinium chloride.

1572 (Boots) (Ethidium bromide) 2:7-diamino-9-phenyl-10-ethylphenanthridinium bromide.

The conclusions drawn from these preliminary experiments were :—

#### 1. Activity against infection with natural strains of *T. congolense* and *T. vivax*.

(a) 150 C 47 was too toxic for use therapeutically,

(b) 621 C 47 was probably at least as effective therapeutically as dimidium bromide and less toxic. It was however capable of producing symptoms simulating those of photosensitisation, at a relatively high dosage. Its prophylactic value was less than three weeks for *T. congolense* and less than two weeks for *T. vivax*.

(c) 115 C 51 showed very little activity against either *T. congolense* or *T. vivax*.

(d) 293 C 51 was not effective against *T. congolense* at 1.0 mg. per kilo and was toxic at higher dosages,

(e) 1572 showed great promise as a trypanocidal drug for both *T. congolense* and *T. vivax*. No beast relapsed after treatment at the lowest dosage tried, namely, 0.5 mg. per kilo. This drug appeared to have a wide therapeutic index and will be given further study.

**2. Activity against antrycide resistant (methylsulphate 5.0 mg. per kilo) *T. congolense*.**

(a) 150 C 47 and 621 C 47 were inactive up to a dosage of 2.0 mg. per kilo.

(b) Dimidium bromide was inactive at a dosage of 1.5 mg. per kilo.

**3. Activity against dimidium bromide resistant (1.5 mg. per kilo) *T. congolense*.**

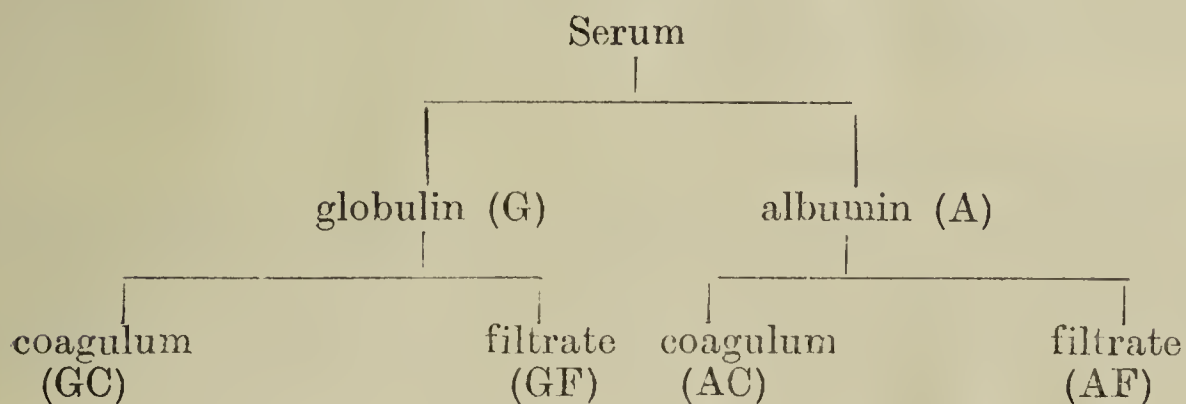
(a) 621 C 47 was not active up to a dosage of 2.0 mg. per kilo,

(b) antrycide (methylsulphate) was active at a dosage of 5.0 mg. per kilo and all (4) the treated cattle appeared to have been cured by the drug.

**2. Contagious bovine pleuro-pneumonia (by F. W. Priestly).**

*Growth factor in Serum.*

In the Annual Report for 1950-51 it was recorded that "The factor in Serum responsible for growth is heat-stable....." this factor was finally traced by fractionating serum according to the following scheme :—



Serum was half-saturated with ammonium sulphate to bring down the globulin (G) ; the filtrate was saturated to bring down the albumin (A). Dialysed solutions of the albumin and globulin were boiled and filtered ; coagula (AC and GC) and filtrates (AF and GF) were collected. Portions of these six fractions was added to broth in amounts estimated to be similar to those contained in 10 percent



serum ; the various media were adjusted to pH 7.6, tubed in 9 c.c. volumes and autoclaved. Growth trials were then run by subculturing 1 c.c. volumes every second day, the initial seed being 1 c.c. of a 2-day serum broth culture. Adequate controls were included.

Growth occurred in broth containing the G, A and AF fractions. Since, as was subsequently shown, the AF fraction is not precipitated by half saturation with ammonium sulphate, it is to be concluded that the fraction appears in the globulin solution purely mechanically. In any case the point at issue is that a heat-stable growth factor, separable from the coaguable proteins has now been isolated.

### **Freeze-Drying.**

Reference was made in the previous Report to the probable increase in virulence following freeze-drying. This is now an established fact as further experiments have shown. As a corollary to this finding it was natural to assume, and has now been demonstrated as fact, that virulence could be *maintained* by freeze-drying.

### **The causes of accidents following vaccination.**

Further experiments on the causes of "accidents" have been carried out during the year. It has been shown that if cultures are re-incubated following refrigeration there is a marked increase in the viable count i.e. re-growth occurs. Since it is known that young cultures of a given strain are more virulent than older cultures it follows that re-incubation must tend to increase virulence. Direct experiments to prove this have not, however, given very satisfactory results. In the first experiment carried out 2 cattle inoculated with ordinary 7-day vaccine remained healthy ; 2 more cattle inoculated with the vaccine refrigerated for 14 days also remained healthy ; one animal inoculated with the refrigerated vaccine which had subsequently been re-incubated for 5 days, developed a generalised arthritis from which the pleuro-pneumonia organism was isolated and from which it died 23 days after inoculation. This result was indicative but repetitions of the experiment have failed to give similar results, all animals persistently refusing to react. The case must, therefore, remain "not proven".

### **Intradermal inoculation.**

Experiments designed to test the efficacy of intradermal inoculation of culture revealed the fact that cattle are *more* susceptible to this method than to any other tried. Small doses (0.2 c.c.) of comparatively non-virulent (generation 25) cultures cause huge swellings and deaths in inoculated cattle.

### **Vaccination with dead organisms.**

Following up the suggestion (now abandoned) that the antigen responsible for immunity was a heat-labile surface one, unsuccessful attempts have been made to immunise cattle with killed organisms. The methods of killing included minimal heat (56 C 1/4 m.) chloroform and natural death in culture. No immunity was demonstrable.



### **The bactericidal action of blood.**

The suggestion previously made that the flocculating and bactericidal antibodies were different had to be abandoned when it was shown that absorption of a powerful bactericidal serum with a heavy suspension of dead organisms abolished both flocculating and bactericidal action.

It has since been shown that the lack of bactericidal action in blood from dying animals is due, not to lack of antibody, but to deficiency of complement. Thus the addition of normal bovine serum to serum from a dying animal makes a powerfully bactericidal mixture ; on the other hand, the addition of unheated serum from a dying animal to heated serum from an immune animal does not make a bactericidal mixture.

Experiments have been designed in an endeavour to find out the cause of this deficiency of complement and it has been shown that the addition of a thin suspension of dead organisms to a powerful bactericidal serum results in complete abolition of the bactericidal action. Since the added organisms are insufficient markedly to affect the antibody content the assumption is that the effect is brought about by fixation of complement. Now, since the majority of animals dying from an artificial infection show a bacteraemia (and it is at least possible that in natural cases soluble somatic antigen is circulating in the blood stream), it is clearly a possibility that an antigen-antibody complex is formed which fixes the complement. However, passive immunity experiments have opened up another line of investigation and another possible explanation.

### **Passive Immunity.**

In these experiments the general practice was to inoculate cattle on one side of the neck with 50 c.c. serum and simultaneously, on the other side with 1 c.c. virulent culture ; 2nd and 3rd injections of serum were given 5 and 10 days later. In all, 14 bulls have been inoculated with “immune” serum (i.e. serum from reactor cattle which recovered) , of which 8 survived ; 7 with “dying” serum (i.e. from reactors which were dying), of which none survived ; and 8 with no serum or serum from normal animals, of which 2 survived. (It should be noted here that all sera had been stored for sometime over chloroform and were bacteriologically sterile).

The results show conclusively that there is a marked difference in the effects of the immune and dying sera but it is not clear whether this is due to protection by the immune sera or to a more rapid death following the inoculation of dying serum. However even animals which die (following the inoculation of immune serum and culture) tend to survive longer than controls and the indication is therefore that immune serum dose gives some protection.

If this conclusion is correct, then since both immune and dying serum contain the flocculating/complement-fixing/bactericidal antibody and only the immune serum protects, there must be a second antibody.

#### **Further experiments on bactericidal action.**

Search for the antigen engendering the hypothetical antibody responsible for passive immunity has not so far been very successful. It was argued that there would be excess of antibody in the serum of recovered animals and excess of the antigen in the serum of dying animals. If the two were mixed together therefore they should produce an antigen-antibody complex capable of fixing added complement and removing it from the bactericidal system. Mixtures of this sort have been tested for ability to fix complement, both by the bactericidal test and by direct titration, but the results have been very inconclusive.

#### **Pleuro-pneumonia-like organisms.**

Once or twice during the year pleuro-pneumonia-like organisms have been isolated from the supposedly sterile horse serum used in Bennett's medium. They are mentioned here because they may constitute a confusing factor in vaccine production. It would seem that such organisms appear in the blood stream intermittently and do not represent a continuous bacteraemia.

#### **Selective Media for the Pleuro-pneumonia Organism.**

Mr. R. W. White carried out a series of tests to try to find a suitable selective medium for the organism. He found that a combination of thallium acetate (1/1000), sulphamezathine (1/5000) and crystal violet (1/100,000) controlled ordinary contamination, and that the organism withstood concentrations of penicillin up to 10,000 units per cc. Experiments were started to determine whether penicillin could be used to reduce contamination during the production of vaccine.

### **V. TSETSE SURVEY AND RECLAMATION.**

The Tsetse Survey and Reclamation Team, created in the early summer of 1951, moved from Equatoria Province to Bahr-El Ghazal Province in November to begin a tsetse survey of the cattle rearing areas of the Southern Sudan north of the main tsetse belt. It started work on a roughly triangular area of about 20,000 square miles with its apex at Wau and extending northwards, bounded (a) on the western side by the road from Wau via Aweil, Winejok to Sumeih on the Bahr-El-Arab, (b) on the northern side by a line from Sumeih to the beginning of the Raqaba el Zarga and along that river until it joins the Bahr-El-Ghazal near Bentiu, and (c) on the south eastern side by the river from Bentiu to Meshra and by the road from Meshra to Wau.

Good progress was made despite the handicap of shortage of staff and by the end of the year sufficient information had been collected about the distribution of tsetse flies in the Jur Narrows Area to put forward, with the approval of the local Province Tsetse Reclamation Advisory Committee, a scheme for the reclamation of that part.

The Jur Narrows Area contains three "islands" of *Glossina morsitans* and they are surrounded by a wide belt of land devoid of vegetational covering essential for the survival of tsetse flies. These



“ islands ” border on the routes of seasonal migration of nearly a quarter of a million cattle to and from a large dried swamp grazing area, and are potentially a very important source of infection of trypanosomiasis. It is not improbable that infected cattle returning northwards at the beginning of the rainy season do in turn act as sources of infection for spread of the disease by biting flies to cattle in southern Kordofan Province.

## VI. PASTURE SURVEY.

It was decided in November that as it would be impossible for the Pasture Research Officer to complete his survey of all the grazing areas and also write his final report before the summer, he should suspend field work immediately and complete that part of his report which dealt with the cattle grazing areas, excluding the Fung District. The second, and final, part of his report, dealing with the camel and sheep grazing areas and the Fung District should be completed early in 1953.

Mr. Harrison spent the next three months at the Commonwealth Bureau of Pasture Plants and Forage Crops at Aberystwyth writing this part of the report and on his return to the Sudan left it there to be stencilled. Both report and stencils were lost in the post on the way to the Sudan and no trace of them found despite most exhaustive enquiries. The first part of the report had consequently to be re-written and this has not yet been completed.

## VII. PUBLICATIONS.

The following papers were published :—

1. PRIESTLEY, F. W. — A Slide Flocculation Test for the Diagnosis of Contagious Bovine Pleuro-Pneumonia,—*Vet. Rec.*, 1951, Vol. 63 pp 427-429.
2. PRIESTLEY, F. W. — Freeze Drying of the Organism of Contagious Bovine Pleuro-Pneumonia—*Jour. Comp. Path. & Therap.*, 1952, Vol. 62 pp 125-135.
3. PRIESTLEY, F. W. — Observations on Immunity to Contagious Bovine Pleuro-Pneumonia with special reference to the Bactericidal Action of the Blood—*Brit. Vet. Jour.*, 1952, Vol. 108 pp 153-161.
4. PRIESTLEY, F. W. and WHITE, R. W. — A Note on the Isolation from Serum of a Heat-Stable Growth Factor for the Growth of the Contagious Bovine Pleuro-Pneumonia Organism—*Vet. Rec.*, 1952, Vol. 64 p 259
5. WHITE, R. W. — Selective Bacteriostatic Substances for the Isolation and Cultivation of *Asterococcus bovis*, the causal organism of Contagious Bovine Pleuro-Pneumonia—*Brit. Vet. Jour.*, 1952, Vol. 108 pp 111-123.

6. DAFALLA, E. N. and SOLTYS, M. A. — Studies on Agglutination of Red Cells by *Clostridia*—*Brit. Jour. Exp. Path.*, 1951, Vol.32 pp 510-515 (Published from the Department of Veterinary Pathology, University of Liverpool.)

### VIII. ACKNOWLEDGMENTS.

It is a pleasure to acknowledge the cheerful way the professional and technical staffs responded to the heavy demands made on the services of the Laboratory and particularly on the frequent occasions when the unclassified staff went on strike in response to instructions from their Trade Union.

Acknowledgment is also made of the cooperation of Dr. R.A. Neal of the Wellcome Laboratories of Tropical Medicine for about four months in the experiments with the phenanthridine derivatives.

J. T. R. EVANS.

15.8.1952.

*Asst/Director ( Research)*





